



Agency for Healthcare Research and Quality

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Outcomes of Pharmaceutical Therapy Program (OPT) Update

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Introduction

The Impact of Pharmaceuticals on Health Care Delivery

Prescription and over-the-counter pharmaceuticals are central to many of the most challenging issues faced in health services delivery and financing today. Representing a major portion of health care dollars spent in the U.S., the role and management of pharmaceuticals raise multiple, complex questions for providers, patients, policymakers, and researchers. During the past decade significant advances have been made in developing tools to help providers evaluate current clinical research information as it applies to individual patients. Critical appraisal and evidence-based techniques continue to evolve as new technical approaches to analyzing research data are developed. The cost of pharmaceuticals may be one of the most debated issues of the next decade as Medicare, Medicaid, and private insurance programs seek to work within public budgets, and/or provide competitive products, while at the same time making available the best that medical treatment has to offer.

The Need for Research

Understanding which agents work for which patients and at what costs is important in managing the selection of pharmaceutical therapies and services within a changing health care environment. However, this information is often not available for many drugs, since the Food and Drug Administration (FDA) approval process only requires pharmaceutical manufacturers to provide evidence of safety and efficacy for one clinical indication and only within controlled clinical trials that often include a relatively homogeneous population. An approved drug may enter the market with relatively little information available to the practitioner, the third-party payer, or the patient about how the drug compares with the array of other therapies available. Once approved by the FDA, medications may legally be prescribed for any use deemed appropriate by a licensed physician. Additionally, patients receiving the medication may differ from patients included in the trials. They may be sicker, older, younger, or have additional diseases. Frequently, adherence to the prescribed regimen may be different than in trials.

AHRQ's Pharmaceutical Research Program

Within the U.S. Department of Health and Human Services, the Agency for Healthcare Research and Quality (AHRQ) supports the study of the relative effectiveness, appropriateness, and cost-effectiveness of alternative strategies for the prevention, diagnosis, treatment, and management of clinical conditions. The Center for Outcomes and Effectiveness Research (COER) has the lead responsibility in AHRQ for the development and administration of research programs related to patient outcomes associated with pharmaceutical therapy.

A total of 18 research grants have been funded under 2 COER programs. Sixteen were funded through COER's *Study of Patient Outcomes Associated with Pharmaceutical Therapy*, which focused on: a) data and analytic methods involved in the study of drug therapy effectiveness; b) factors affecting the appropriateness of drug prescribing; and c) the role of the patient in drug therapy effectiveness. Two additional projects were funded under the program *Research on the Outcomes of Pharmaceutical Therapy*, which gave preference to projects focusing on pharmaceutical economic analysis and effects on patient outcomes of changes in the health care environment. Other studies addressing pharmaceuticals have been funded through the Patient Outcomes Research Teams (PORTs).

Centers for Education and Research on Therapeutics (CERTs)

In 1999, AHRQ announced a new, more comprehensive program which expanded the pharmaceutical outcomes program through Centers for Education and Research on Therapeutics. Information on this program is contained in Appendix B.

Overview of Study Findings

In the context of these research objectives, Pharmaceutical Outcomes and PORTs address many of today's most critical health care issues, including those related to: treatment effectiveness, the cost and quality of care, research and patient management tools that support evidence-based practice, racial and ethnic disparities in service delivery, prevalent chronic conditions in the U.S. population, health care prevention, and the needs of the elderly. The following are some of the notable study findings related to these areas. The grant number is included so that the original publication may be located further back in this document.

Treatment Effectiveness

- A study examining short-term outcomes in diabetic patients found that improved glycemic control of the patients' diabetes was associated with substantial short-term quality of life and health economic benefits. (*Testa, Simonson 1999*). Grant HS07767.
- A study examining the differences in quality of life produced by the same hypertension treatment (calcium channel blockers) using two different medication delivery systems (nifedipine gastrointestinal therapeutic system and amlodipine) suggested medication-specific effects on quality of life may be due to difference in delivery. (*Testa, Turner, Simonson, Krafcik, Calvo, Luque-Otero 1998*). Grant HS07767.
- Focus groups of HIV-infected individuals were conducted to assess how the HIV wasting syndrome had affected them in several areas (physical, psychological, social). Generic measures of quality of life fail to provide the sensitivity and depth required to evaluate major issues raised by the focus group participants with respect to the specific impact of HIV wasting on their lives. (*Testa, Lenderking 1999*). Grant HS07767.
- A retrospective cohort study that used linked New Jersey Medicare and drug claims data found that the use of long-acting dihydropyridine calcium channel blockers after acute myocardial infarction (AMI) was associated with substantially lower rates of re-hospitalization and death compared with use of their short-acting counterparts. (*Gillman, Ross-Degnan, McLaughlin, Gao, Spiegelman, Hertzmark, Goldman, Soumerai 1999*). Grant HS07631.
- Only 21 percent of eligible New Jersey Medicare beneficiaries who survived an acute myocardial infarction (AMI) receive beta blocker therapy following the heart attack. These patients were almost three times as likely to receive a new prescription for a calcium channel blocker than for a beta blocker after their AMI. Eligible patients receiving calcium channel blockers instead of beta blockers doubled their risk of death. (*Soumerai, McLaughlin, Spiegelman, 1997*). Grant HS07631.
- The Lyme Disease Project calculated the incidence rate of Lyme disease in the 24 Maryland jurisdictions by gender and age from 1993 through 1996. The State's overall incidence rate was 7 cases per 100,000 inhabitants, with males being 1.2 times more likely to be affected than females, peaking during the age groups 10-19, 20-29, and 50-59. (*Pena, Strickland 1999*). The Project also conducted an epidemiological assessment of antibiotics prescribed by physicians in Maryland to treat Lyme disease between 1993-1995. (*Pena, Mathews, Siddiqi, Strickland 1999*). Grant HS07813.

The Cost and Economics of Health Care

- Thirty percent of children treated for new-onset acute otitis media in Colorado's fee-for-service Medicaid program received expensive antibiotic therapy, rather than less costly, equally efficacious products. More expensive antibiotics accounted for approximately 77 percent of the dollars spent for medications to treat otitis media in this population, but were not associated with better outcomes. (*Berman, Byrnes, Bondy, Smith, Lezzotte 1997*). Grant HS07816.
- Prior authorization by Tennessee Medicaid programs for expensive arthritis medications (non-steroidal anti-inflammatories, or NSAIDs) reduced prescription NSAID expenditures by 53 percent over 2 years and saved \$12.8 million, without increasing the use of other medical services or less desirable drugs. (*Smalley, Griffin, Fought, Sullivan, Ray 1995*). Grant HS07768.
- The impact of a three-prescription per month cap in New Hampshire on the use of resources by Medicaid enrollees with schizophrenia resulted in reductions in the use of drugs, coincident increases in visits to community mental health clinics, and dramatic increases in the use of emergency services. Limits on prescription drug coverage may increase the use of acute mental health services among low-income patients with chronic mental illnesses and increase costs to the government. (*Soumerai, McLaughlin, Ross-Degnan, Casteris, Bollini 1994*). Grant HS07631.

Tools for Patient Management

- An automated Web-based patient interview tool was developed to elicit individuals' willingness-to-pay (WTP) utilities under conditions of uncertainty, and to evaluate the tool's potential usefulness for clinical decisionmaking. (*Flowers, Garber, Bergen, Lenert 1997*). Grant HS07818.
- A study to incorporate complex heart failure treatment guidelines into a physician-interactive network of microcomputer stations revealed key challenges for the development of interactive information systems, including the need for explicit definitions and the need to account for comorbid conditions, concurrent drug therapy, timing of interventions, and followup. (*Tierney, Overhage, Takesue, Harris, Murray, Vargo, McDonald 1995*). Grant HS07763.
- A study evaluating the validity of patient report, pharmacy dispensing records, and pill counts as measures of medication adherence found that: pharmacy dispensing records demonstrate predictive validity as measures of cumulative exposure and gaps in medication supply; adherence levels determined from pill counts and pharmacy dispensing records correlate more closely with quantity than with dose timing; and patient-reported nonadherence is a valid predictor of reduced adherence. (*Choo, Rand, Inui, Lee, Cain, Cordeiro-Breault, Canning, Platt 1998*). Grant HS07821.

Target Populations: Racial and Ethnic Groups, the Elderly

- An evaluation of the relationship between non-steroidal anti-inflammatory drug (NSAID) use in community-dwelling elderly found no substantial protective effect of prescription NSAID use on cognitive function, and in fact suggested that higher doses may be associated with memory deterioration in this population. (*Hanlon, Schmader, Landerman, Horner, Fillenbaum, Pieper, Wall, Koronkowski, Cohen 1997*). Grant HS07819.
- Inadequate routine primary care among African American patients may increase their risk of asthma exacerbation and hospitalization, and is associated with higher emergency department use compared with white males. (*Murray, Stang, Tierney 1997*). Grant HS07763.

- Researchers found racial disparities in the receipt of medication to prevent *Pneumocystis carinii* pneumonia (PCP) among patients with HIV disease. (Moore, Stanton, Gopalan, Chaisson, 1994). Grant HS07809.
- Among patients with HIV infection who received medical care from a single urban center, there were no differences in disease progression or survival associated with gender, race, injection drug use, or socioeconomic status. Differences found in other studies may reflect differential use, quality, and access to care. (Chaisson, Keruly, Moore, 1995). Grant HS07809.

Public Health and Prevention, and Chronic and Persistent Disease

- An assessment of the long-term safety of adjunctive corticosteroids in the treatment of *Pneumocystis carinii* pneumonia (PCP) found that adjunctive corticosteroids do not increase mortality or the risk of most common HIV-associated complications. (Gallant, Chaisson, Moore 1998). Grant HS07809.
- Researchers concluded that active injection drug users who are HIV positive but without clinical disease have less contact with health care providers and are less likely to receive antiretroviral therapy than other HIV positive patients. (Celentano, Vlahor, Cohn, Shadle, Obasanjo, Moore 1998). Grant HS07809.
- An analysis of information stored in electronic medical records for patients with evidence of ischemic heart disease or heart failure successfully predicted patients at high risk for mortality. Routine clinical data stored in patients' electronic medical records are capable of predicting mortality and can be used to focus increasingly scarce health resources on those at highest mortality risk. (Tierney, Takesue, Vargo, Zhou 1996). Grant HS07763.
- A retrospective cohort study examined factors associated with failure to suppress HIV-1 RNA levels and adverse drug reactions in patients receiving protease inhibitor-containing therapy. The study concluded that patients in whom highly active antiretroviral therapy (HAART) is started in a clinic setting achieved viral suppression substantially less frequently than patients in controlled clinical trials. (Lucas, Chaisson, Moore 1999). Grant HS07809.

These grants answer many important questions regarding the management of drug prescribing. Their findings are successfully being used by organizations such as the Health Care Financing Administration to evaluate programs that seek to manage care and improve quality and outcomes. In addition to studies funded through the Pharmaceutical Outcomes Program, AHRQ has other projects in its portfolio that, although not solely focused on pharmaceuticals, have findings of interest to the pharmaceutical research community. These are listed in Appendix A.

Projects Funded Through RFA HS-92-03: Study of Patient Outcomes Associated with Pharmaceutical Therapy

Comparative Outcomes of Ambulatory Pharmaceutical Agents

Principal Investigator:

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Grant Number: HS07782

Project Period: 03/93 - 02/97

AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: The project developed a computer-based automatic process called Real-Time Meta-Analysis System (RTMAS). This process organizes, routinely updates, and displays randomized controlled trials (RCT) and meta-analyses of pharmaceuticals in a simple and easy to understand matrix format. This significantly reduces the time required to conduct a systematic review and/or meta-analysis of the effectiveness or comparative effectiveness of one or more therapeutic agents. A major contribution of the project is in the methodological improvement of meta-analysis with the development of control rate meta-regression. This latter methodological innovation was supported in a well-recognized study on the discrepancies between meta-analysis and a large RCT.

Publications to Date

The Asilomar Working Group on Recommendations for Reporting of Clinical Trials in the Biomedical Literature. (1996). Checklist of information for inclusion in reports of clinical trials. *Annals of Internal Medicine*. 124 (8): 741-743.

Barza, M., Ioannidis, J.P., Cappelleri, J.C., & Lau, J. (1996). Single or multiple daily doses of aminoglycosides: a meta-analysis. *British Medical Journal*. 312 (7027): 338-345.

Berkey, C.S., Mosteller, F., Lau, J., & Antman, E.M. (1996). Uncertainty of the time of first significance in random effects cumulative meta-analysis. *Controlled Clinical Trials*. 17 (5): 357-371.

Bonis, P.A., Ioannidis, J.P., Cappelleri, J.C., Kaplan, M.M., & Lau, J. (1997). Correlation of biochemical response to interferon alfa with histological improvement in hepatitis C: a meta-analysis of diagnostic test characteristics. *Hepatology*. 26 (4): 1035-1044.

Cappelleri, J.C., & Trochim, W.M. (1994). An illustrative statistical analysis of cutoff-based randomized clinical trials. *Journal of Clinical Epidemiology*. 47 (3): 261-270.

Cappelleri, J.C., & Trochim, W.M. (1995). Ethical and scientific features of cutoff-based designs of clinical trials: a simulation study. *Medical Decision Making*. 15 (4): 387-394.

Cappelleri, J.C., Darlington, R.B., & Trochim, W.M. (1994). Power analysis of cutoff-based randomized clinical trials. *Evaluation Review*. 18 (2): 141-152.

Cappelleri, J.C., Fiore, L., Brophy, M., & Lau, J. (1994). Efficacy and safety of anticoagulant and antiplatelet therapy versus anticoagulant therapy after heart-valve replacement: a meta-analysis [abstract]. *Controlled Clinical Trials: Design, Methods, and Analysis*. 15 (3, suppl.): 47S-48S.

Cappelleri, J.C., Fiore, L.D., Brophy, M.T., Deykin, D., & Lau, J. (1995). Efficacy and safety of combined anticoagulant and antiplatelet therapy versus anticoagulant monotherapy after mechanical heart-valve replacement: a meta-analysis. *American Heart Journal*. 130 (3, pt. 1): 547-552.

- Cappelleri, J.C., Ioannidis, J.P., Schmid, C.H., de Ferranti, S.D., Aubert, M., Chalmers, T.C., & Lau, J. (1996). Large trials vs meta-analysis of smaller trials: how do their results compare? *Journal of the American Medical Association*. 276 (16): 1332-1338.
- Cappelleri, J.C., Lau, J., Kupelnick, B., & Chalmers, T.C. (1994). Efficacy and safety of different aspirin dosages on vascular diseases: a meta-analysis [abstract]. *Clinical Research*. 42 (2): 289A.
- Cappelleri, J.C., Lau, J., Kupelnick, B., & Chalmers, T.C. (1995). Efficacy and safety of different aspirin dosages on vascular diseases in high-risk patients. A metaregression analysis. *Online Journal of Current Clinical Trials*. Doc. No. 174.
- Chalmers, T.C., & Lau, J. (1993). Meta-analytic stimulus for changes in clinical trials. *Statistical Methods in Medical Research*. 2 (2): 161-172.
- Chalmers, T.C., & Lau, J. (1993). Randomized control trials and meta-analyses in gastroenterology: major achievements and future potential. *Annals of the New York Academy of Sciences*. 703: 96-105; discussion 105-106.
- Chalmers, T.C., & Lau, J. (1996). Changes in clinical trials mandated by the advent of meta-analysis. *Statistics in Medicine*. 15 (12): 1263-8; discussion 1269-1272.
- de Ferranti, S.D., Ioannidis, J.P., Lau, J., Anninger, W.V., & Barza, M. (1998). Are amoxycillin and folate inhibitors as effective as other antibiotics for acute sinusitis? A meta-analysis. *British Medical Journal*. 317 (7159): 632-637.
- Engels, E.A., Lau, J., & Barza, M. (1998). Efficacy of quinolone prophylaxis in neutropenic cancer patients: a meta-analysis. *Journal of Clinical Oncology*. 16 (3): 1179-1187.
- Freedberg, K.A., Hardy, W.D., Holzman, R.S., Tosteson, A.N. & Craven, D.E. (1996). Validating literature-based models with direct clinical trial results: the cost-effectiveness of secondary prophylaxis for PCP in AIDS patients. *Medical Decision Making*. 16 (1): 29-35.
- Giatras, I., Lau, J., & Levey, A.S. (1997). Effect of angiotensin-converting enzyme inhibitors on the progression of nondiabetic renal disease: a meta-analysis of randomized trials. Angiotensin-Converting-Enzyme Inhibition and Progressive Renal Disease Study Group. *Annals of Internal Medicine*. 127 (5): 337-345.
- Insua, J.T., Sacks, H.S., Lau, T.S., Lau, J., Reitman, D., Pagano, D., & Chalmers, T.C. (1994). Drug treatment of hypertension in the elderly: a meta-analysis. *Annals of Internal Medicine*. 121 (5): 355-362.
- Ioannidis, J.P.A., & Lau, J. (1997). The impact of high-risk patients on the results of clinical trials. *Journal of Clinical Epidemiology*. 50 (10): 1089-1098.
- Ioannidis, J.P.A. & Lau, J. (1996). The impact of high-risk patients on the population risk and on the population treatment effect. *Journal of Clinical Epidemiology*. 46 (1): 48-56.
- Ioannidis, J.P.A., Cappelleri, J.C., Lau, J., Sacks, H.S., & Skolnik, P.R. (1996). Predictive value of viral load measurements in asymptomatic untreated HIV-1 infection: a mathematical model. *AIDS*. 10 (3): 255-262.
- Ioannidis, J.P.A., Cappelleri, J.C., Lau, J., Skolnik, P.R., Melville, B., Chalmers, T.C., & Sacks, H.S. (1995). Early or deferred zidovudine therapy in HIV-infected patients without an AIDS-defining illness. *Annals of Internal Medicine*. 122 (11): 856-866.
- Ioannidis, J.P.A., Cappelleri, J.C., Sacks, H.S., & Lau, J. (1997). The relationship between study design, results, and reporting of randomized clinical trials of HIV infection. *Controlled Clinical Trials*. 18 (5): 431-444.

- Ioannidis, J.P.A., Cappelleri, J.C., Skolnik, P.R., Lau, J., & Sacks, H.S. (1996). A meta-analysis of the relative efficacy and toxicity of *Pneumocystis carinii* prophylactic regimens. *Archives of Internal Medicine*. 156 (2): 177-188.
- Ioannidis, J.P.A., Sacks, H.S., Cappelleri, J.C., & Lau, J. Clinical efficacy of antiretroviral changes in treatment-experienced HIV-infected patients: a meta-analysis. *Online Journal of Current Clinical Trials*, May 15, 1997; (Doc. Wo. 204).
- Lau, J. (1997). Comparative outcomes of ambulatory pharmaceutical agents: abstract, executive summary, and final report. *Report for March 1993-February 1997*. Boston, MA: New England Medical Center. NTIS No. PB98-115405.
- Lau, J., & Chalmers, T.C. (1994). Should intravenous magnesium be given to patients with acute myocardial infarction? [abstract]. *Clinical Research*. 42 (2): 290A.
- Lau, J., & Chalmers, T.C. (1995). The rational use of therapeutic drugs in the 21st century: important lessons from cumulative meta-analyses of randomized control trials. *International Journal of Technology Assessment in Health Care*. 11 (3): 509-522.
- Lau, J., Schmid, C.H., & Chalmers, T.C. (1995). Cumulative meta-analysis of clinical trials builds evidence for exemplary medical care. *Journal of Clinical Epidemiology*. 48 (1): 45-57; discussion 59-60.
- Levey, A.S., Schmid, C.H., & Lau, J. (1998). Antilymphocyte antibodies, renal transplantation, and meta-analysis [editorial; comment]. *Annals of Internal Medicine*. 128 (10): 863-865.
- Pedrin, M.T., Levey, A.S., Lau, J., Chalmers, T.C., & Wang, P.H. (1996). The effect of dietary protein restriction on the progression of diabetic and nondiabetic renal diseases: a meta-analysis. *Annals of Internal Medicine*. 124 (7): 627-632.
- Reichardt, C.S., Trochim, W.M.K., & Cappelleri, J.C. (1995). Reports of the death of regression-discontinuity analysis are greatly exaggerated. *Evaluation Review*. 19 (1): 39-63.
- Schmid, C.H., Cappelleri, J.C., & Lau, J. (1994). Applying Bayesian meta-regression to the study of thrombolytic therapy [abstract]. *Clinical Research*. 42 (2): 290A.
- Wang, P.H., Lau, J., & Chalmers, T.C. (1994). Meta-analysis of the effect of intensive therapy on nephropathy in type I diabetes mellitus. In C.E. Mogensen (Ed.), *The Kidney and Hypertension in Diabetes Mellitus* (2nd ed., pp. 361-368). Kluwer Academic Publishers Norwell, MA.
- Working Group on Recommendations for Reporting of Clinical Trials in the Biomedical Literature. (1994). Call for comments on a proposal to improve reporting of clinical trials in the biomedical literature. *Annals of Internal Medicine*. 121 (11): 894-895.
- Zucker, D.R., Schmid, C.H., McIntosh, M.W., D'Agostino, R.B., Selker, H.P., & Lau, J. (1997). Combining single patient (N-of-1) trials to estimate population treatment effects and to evaluate individual patient responses to treatment. *Journal of Clinical Epidemiology*. 50 (4): 401-410.

Computer-Based Prospective Drug Utilization Review

Principal Investigator:
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Grant Number: HS07763
Project Period: 07/93 - 01/97
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: The investigators developed an automated medical record system that incorporated existing treatment guidelines. A randomized controlled clinical trial was conducted to demonstrate the impact of this computer-based system on patient-centered outcomes. The trial concluded without a positive result, which demonstrates the difficulties in implementing a computer-based treatment guideline system and the need for further research in the field.

Publications to Date

- Bates, A.S., Harris, L.E., Tierney, W.M., & Wolinsky, F.D. (1998). Dimensions and correlates of physician work satisfaction in a midwestern city. *Medical Care*. 36 (4): 610-617.
- Berg, A.O., Atkins, D., & Tierney, W. (1997). Clinical practice guidelines in practice and education. *Journal of General Internal Medicine*. 12 (2, suppl.): S25-33.
- Callahan, C.M., & Tierney, W.M. (1995). Health services use and mortality among older primary care patients with alcoholism. *Journal of the American Geriatrics Society*. 43 (12): 1378-1383.
- Callahan, C.M., Dittus, R.S., & Tierney, W.M. (1996). Primary care physicians' medical decision making for late-life depression. *Journal of General Internal Medicine*. 11 (4): 218-225.
- Callahan, C.M., Hendrie, H.C., & Tierney, W.M. (1996). The recognition and treatment of late-life depression: a view from primary care. *International Journal of Psychiatry in Medicine*. 26 (2): 155-171; discussion 173-175.
- Callahan, C.M., Hendrie, H.C., Nienaber, N.A., & Tierney, W.M. (1996). Suicidal ideation among older primary care patients. *Journal of the American Geriatrics Society*. 44 (10): 1205-1209.
- Callahan, C.M., Kesterson, J.G., & Tierney, W.M. (1997). Association of symptoms of depression with diagnostic test charges among older adults. *Annals of Internal Medicine*. 126 (6): 426-432.
- Callahan, C.M., Wolinsky, F.D., Stump, T.E., Nienaber, N.A., Hui, S.L., & Tierney, W.M. (1998). Mortality, symptoms, and functional impairment in late-life depression. *Journal of General Internal Medicine*. 13 (11): 746-752.
- Harris, L.E., Luft, F.C., Rudy, D.W., & Tierney, W.M. (1995). Correlates of health care satisfaction in inner-city patients with hypertension and chronic renal insufficiency. *Social Sciences and Medicine*. 41 (12): 1639-1645.
- Harris, L.E., Luft, F.C., Rudy, D.W., Kesterson, J.G., & Tierney, W.M. (1998). Effects of multidisciplinary case management in patients with chronic renal insufficiency. *American Journal of Medicine*. 105 (6): 464-471.
- Harris, L.E., Weinberger, M., & Tierney, W.M. (1997). Assessing inner-city patients' hospital experiences. A controlled trial of telephone interviews versus mailed surveys. *Medical Care*. 35 (1): 70-76.
- Litzelman, D.K., & Tierney, W.M. (1996). Physicians' reasons for failing to comply with computerized preventive care guidelines. *Journal of General Internal Medicine*. 11 (8): 497-499.
- McDonald, C.J., Tierney, W.M., Overhage, J.M., Martin, D.K., Smith, B., Wodniak, C., Blevins, L., Warvel, J., Warvel, J., Meeks-Johnson, J., et al. (1994). The Regenstrief Medical Record System—experience with MD order entry and community-wide extensions. *Proceedings of the Annual Symposium on Computer Applications*

in *Medical Care*. 1059.

McDonald, C.J., & Overhage, J.M. (1994). Guidelines you can follow and can trust. An ideal and an example [editorial; comment]. *Journal of the American Medical Association*. 271 (11): 872-873.

Melfi, C.A., Drake, B.G., & Tierney, W.M. (1996). The role of public opinion in drug resource allocation decisions. *PharmacoEconomics*. 9 (2): 106-112.

Murray, M.D., & Tierney, W.M. (1996). Using computer-based records to predict mortality risk for inner-city patients with reactive airways disease [abstract]. *Journal of General Internal Medicine*. 11 (suppl.): 53.

Murray, M.D., & Tierney, W.M., (1996). Predicting exacerbations of reactive airways disease using electronic medical records [abstract]. *Journal of General Internal Medicine*. 11 (suppl.): 52.

Murray, M.D., Harris, L.E., Overhage, J.M., Zhou, X.H., Smith, F., & Tierney, W.M. (1997). Association between medication possession ratio and reported compliance [abstract]. *Journal of General Internal Medicine*. 12 (suppl.): 77.

Murray, M.D., Loos, B., Tu, W., Eckert, G.J., Zhou, X.H., & Tierney, W.M. (1998). Effects of computer-based prescribing on pharmacist work patterns. *Journal of the American Medical Informatics Association*. 5 (6): 546-553.

Murray, M.D., Loos, B., Tu, W., Eckert, G.J., Zhou, X.H., & Tierney, W.M. (1999). Work patterns of ambulatory care pharmacists with access to electronic guideline-based treatment suggestions. *American Journal of Health System Pharmacy*. 56 (3): 225-232.

Murray, M.D., Rupp, M.T., Overhage, J.M., Ebbeler, D.E., Main, J.W., & Tierney, W.M. (1995). Multidimensional work sampling in an outpatient pharmacy. *Pharmacy Practice Management Quarterly*. 15 (3): 44-56.

Murray, M.D., Stang, P., & Tierney, W.M. (1997). Health care use by inner-city patients with asthma. *Journal of Clinical Epidemiology*. 50 (2): 167-174.

Overhage, J.M., Hayward, R.S.A., Wolinsky, F.D., & Tierney, W.M. (1995). Effect of individual internist's characteristics on attitudes toward guidelines [abstract]. *Journal of General Internal Medicine*. 10 (4): 76.

Overhage, J.M., Mamlin, B., Warvel, J., Warvel, J., Tierney, W., & McDonald, C.J. (1995). A tool for provider interaction during patient care: G-CARE. *Proceedings of the Annual Symposium on Computer Applications in Medical Care*. 1995: 178-182.

Overhage, J.M., Tierney, W.M., & McDonald, C.J. (1993). Intelligent orders enhance inpatient care process [abstract]. *Medical Decision Making*. 13 (4): 395.

Overhage, J.M., Tierney, W.M., & McDonald, C.J. (1993). Computer-assisted order-writing improves compliance with ordering guidelines [abstract]. *Clinical Research*. 41 (3): 716A.

Overhage, J.M., Tierney, W.M., & McDonald, C.J. (1995). Design and implementation of the Indianapolis Network for Patient Care and Research. *Bulletin of the Medical Library Association*. 83 (1): 48-56.

Redelmeier, D.A., & Tierney, W.M. (1994). On the distinction between probability and trickiness when diagnosing patients with chest pain [abstract]. *Journal of General Internal Medicine*. 9 (2, suppl.): 40.

Tierney, W.M. (1998). Computer-based prospective drug utilization review: abstract, executive summary, and final report. *Report for July 1993-December 1997*. Indianapolis, IN: Indiana University. NTIS No. PB98-139751.

- Tierney, W.M., Horton, S.M., Hannan, T.J., & Tierney, W.M. (1998). Relationships between symptom relief, quality of life, and satisfaction with hospice care. *Palliative Medicine*. 12 (5): 333-344.
- Tierney, W.M., & Harris, L.E. (1996). Using electronic medical records to predict all-cause mortality among inner-city patients with uncomplicated hypertension [abstract]. *Journal of General Internal Medicine*. 11 (suppl.): 55.
- Tierney, W.M., Murray, M.D., Gaskins, D.L., & Zhou, X.H. (1997). Using computer-based medical records to predict mortality risk for inner-city patients with reactive airways disease. *Journal of the American Medical Informatics Association*. 4 (4): 313-321.
- Tierney, W.M., Overhage, J.M., & McDonald, C.J. (1994). A plea for controlled trials in medical informatics [editorial]. *Journal of the American Medical Informatics Association*. 1 (4): 353-355.
- Tierney, W.M., Overhage, J.M., & McDonald, C.J. (1995). Toward electronic medical records that improve care [editorial; comment]. *Annals of Internal Medicine*. 122 (9): 725-726.
- Tierney, W.M., Overhage, J.M., & McDonald, C.J. (1996). Computerizing guidelines: factors for success. *Proceedings of the American Medical Informatics Association Annual Fall Symposium*. 459-462.
- Tierney, W.M., Overhage, J.M., & McDonald, C.J. (1997). Demonstrating the effects of an IAIMS on health care quality and cost. *Journal of the American Medical Informatics Association*. 4 (2, suppl.): S41-46.
- Tierney, W.M., Overhage, J.M., McDonald, C.J., & Wolinsky, F.D. (1994). Medical students' and housestaff's opinions of computerized order-writing. *Academic Medicine*. 69 (5): 386-389.
- Tierney, W.M., Overhage, J.M., Takesue, B.Y., Harris, L.E., Murray, M.D., Vargo, D.L., & McDonald, C.J. (1995). Computerizing guidelines to improve care and patient outcomes: the example of heart failure. *Journal of the American Medical Informatics Association*. 2 (5): 316-322.
- Tierney, W.M., Takesue, B.Y., Vargo, D.L., & Zhou, X.H. (1996). Using electronic medical records to predict mortality in primary care patients with heart disease: prognostic power and pathophysiologic implications. *Journal of General Internal Medicine*. 11 (2): 83-91.
- Tierney, W.M., Zhou, X.H., Takesue, B.Y., & Vargo, D.L. (1994). Changing clinical data and unstable predictions of mortality in congestive heart failure [abstract]. *Journal of General Internal Medicine*. 9 (2, suppl.): 37.
- Wolinsky, F.D., Wyrwich, K.W., Nienaber, N.A., & Tierney, W.M. (1998). Generic versus disease-specific health status measures. An example using coronary artery disease and congestive heart failure patients. *Evaluation of the Health Professions*. 21 (2): 216-243.
- Wyrwich, K.W., Nienaber, N.A., Tierney, W.M., & Wolinsky, F.D. (1999). Linking clinical relevance and statistical significance in evaluating intra-individual changes in health-related quality of life. *Medical Care*. 37 (5): 469-478.
- Wyrwich, K.W., Tierney, W.M., & Wolinsky, F.D. (1998). Does the standard error of measurement identify clinically relevant individual change in health related quality of life measures? *Quality of Life Research*. 7 (7): 676-677.
- Wyrwich, K.W., Tierney, W.M., & Wolinsky, F.D. (1999). Further evidence supporting an SEM-based criterion for identifying meaningful intra-individual changes in health-related quality of life. *Journal of Clinical Epidemiology*. 52 (9): 861-873.
- Zhou, X.H. (1995). Testing an underlying assumption on a ROC curve based on rating data. *Medical Decision Making*. 15 (3): 276-282.

Zhou, X.H. (1996). Empirical Bayes combination of estimated areas under ROC curves using estimating equations. *Medical Decision Making*. 16 (1): 24-28.

Zhou, X.H., Melfi, C.A., & Hui, S.L. (1997). Methods for comparison of cost data. *Annals of Internal Medicine*. 127 (8, pt. 2): 752-756.

Improving Outcomes in Elderly NSAID Users

Principal Investigator:
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Vanderbilt University
Nashville, TN

Grant Number: HS07768
Project Period: 07/93 - 06/98
AHRQ Project Officer: Charlotte A. Mullican, M.P.H.

Summary: The investigators designed an intervention to reduce the use of non-steroidal anti-inflammatories (NSAIDs) for osteoarthritis in an elderly population. Two RCTs were designed to test the effectiveness of a physician education program in reducing use of NSAIDs.

Publications to Date

Burnett, C.B., Steakley, C.S., & Tefft, M.C. (1995). Low-income, minority women: barriers to cancer screening. *Annals of the New York Academy of Sciences*. 768: 277-280.

Griffin, M.R. (1993). NSAID use in the elderly: prevalence and problems. New Jersey: Scientific Therapeutics Information, Inc.

Griffin, M.R. Nonsteroidal anti-inflammatory drugs. In K.D. Brandt, S. Lohmander, and M. Doherty (Eds.). *Osteoarthritis*. Oxford University Press: Oxford; New York. 1998. 261-271.

Griffin, M.R., Brandt, K.D., Liang, M.H., Pincus, T., & Ray, W.A. (1995). Practical management of osteoarthritis. Integration of pharmacologic and nonpharmacologic measures. *Archives of Family Medicine*. 4 (12): 1049-1055.

Hochberg, M.C., Altman, R.D., Brandt, K.D., Clark, B.M., Dieppe, P.A., Griffin, M.R., Moskowitz, R.W., & Schnitzer, T.J. (1995). Guidelines for the medical management of osteoarthritis—Part I: osteoarthritis of the hip. *Arthritis and Rheumatism*. 38 (11): 1535-1540.

Hochberg, M.C., Altman, R.D., Brandt, K.D., Clark, B.M., Dieppe, P.A., Griffin, M.R., Moskowitz, R.W., & Schnitzer, T.J. (1995). Guidelines for the medical management of osteoarthritis—Part II: osteoarthritis of the knee. *Arthritis and Rheumatism*. 38 (11): 1541-1546.

Puett, D.W., & Griffin, M.R. (1994). Published trials of nonmedicinal and noninvasive therapies for hip and knee osteoarthritis. *Annals of Internal Medicine*. 121 (2): 133-140.

Ray, W.A. (1997). Policy and program analysis using administrative databases. *Annals of Internal Medicine*. 127 (8, pt. 2): 712-718.

Ray, W.A. Economic considerations in the use of nonsteroidal anti-inflammatory drugs. Oxford University Press.

Smalley, W.E., & Griffin, M.R. (1996). Risks and costs of upper gastrointestinal disease attributable to NSAIDs: eicosanoids and the GI tract. *Gastroenterology Clinics of North America*. June; 25 (2): 373-96. Review.

Smalley, W.E., Griffin, M.R., Fought, R.L., & Ray, W.A. (1996). Excess costs from gastrointestinal disease associated with nonsteroidal anti-inflammatory drugs. *Journal of General Internal Medicine*. 11 (8): 461-469.

Smalley, W.E., Griffin, M.R., Fought, R.L., Sullivan, L., & Ray, W.A. (1995). Effect of a prior-authorization requirement on the use of nonsteroidal antiinflammatory drugs by Medicaid patients. *New England Journal of Medicine*. 332 (24): 1612-1617.

Outcomes Associated with Therapy for Otitis Media

Principal Investigator:
Stephen Berman, M.D.
University of Colorado
Denver, CO 80262

Grant Number: HS07816
Project Period: 07/93 - 06/97
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: This study focused on the comparative cost-effectiveness of various antibiotic treatments of otitis media. The investigators used the Colorado State Medicaid database to identify exposure and outcomes. The findings of this project suggest that although physicians often prescribed the more expensive antibiotics, these products were not associated with better outcomes.

Publications to Date

Berman, S. (1995). Otitis media in children. *New England Journal of Medicine*. 332 (23): 1560-1565.

Berman, S. (1997). Utilization of services for otitis media by children enrolled in Medicaid. *Archives of Pediatric Adolescent Medicine*. 151: 407-413.

Berman, S. (1999). A three step approach to treating otitis media [letter; comment]. *Pediatric Infectious Diseases Journal*. 18 (6): 571-572.

Berman, S., Bondy, J., Lezotte, D., Stone, B., & Byrns, P.J. (1999). The influence of having an assigned Medicaid primary care physician on utilization of otitis media-related services. *Pediatrics*. 104 (5, pt. 2): 1192-1197.

Berman, S., Byrns, P., Roark, R., & Bondy, J. (1995). The effect of having a Medicaid primary care provider on the utilization of otitis related services [abstract]. *Pediatric Research*. 37 (4, pt. 2): 103A.

Berman, S., Byrns, P., Roark, R., & Bondy, J. (1995). The effect of having a Medicaid primary care provider on the utilization of otitis related services [abstract]. *Archives of Pediatrics and Adolescent Medicine*. 149 (suppl.).

Berman, S., Byrns, P.J., Bondy, J., Smith, P.J., & Lezotte, D. (1997). Otitis media-related antibiotic prescribing patterns, outcomes, and expenditures in a pediatric Medicaid population. *Pediatrics*. 100 (4): 585-592.

Berman, S., Wu, K., & Roark, R. (1999). Management of otitis media with effusion with prednisone in combination with an antibiotic. *International Pediatrics*. 14 (4): 30-33.

Berman, S. Outcomes associated with therapy for otitis media: abstract, executive summary, and final report. *Report for July 1993-June 1997*. Denver, Colorado: Children's Hospital. NTIS No. PB 98-119480.

Byrns, P.J., Bondy, J., Glazner, J.E., & Berman, S. (1997). Utilization of services for otitis media by children enrolled in Medicaid. *Archives of Pediatrics and Adolescent Medicine*. 151 (4): 407-413.

Roark, R., Petrofski, J., Berson, E., & Berman, S. (1995). Practice variations among pediatricians and family physicians in the management of otitis media. *Archives of Pediatrics and Adolescent Medicine*. 149: 839-844.

Outcomes of Compliance with an AMI Practice Guideline

Principal Investigator:
Stephen B. Soumerai, M.D.
Harvard Medical School
Boston, MA 02215

Grant Number: HS07631
Project Period: 12/93 - 11/96
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: This study used Medicaid data to confirm that beta-blocker therapy reduces mortality and cardiac hospitalizations of myocardial infarction (MI) in elderly patients. The study was the first of several peer-reviewed articles that provided real-world confirmation of clinical trial evidence for the benefit of these agents.

Publications to Date

Gillman, M.W., Ross-Degnan, D., McLaughlin, T.J., Gao, X., Spiegelman, D., Hertzmark, E., Goldman, L., & Soumerai, S.B. (1999). Effects of long-acting versus short-acting calcium channel blockers among older survivors of acute myocardial infarction. *Journal of the American Geriatric Society*. 47 (5): 512-517.

Soumerai, S.B., McLaughlin, T.J., Ross-Degnan, D., Casteris, C.S., & Bollini, P. (1994). Effects of a limit on Medicaid drug-reimbursement benefits on the use of psychotropic agents and acute mental health services by patients with schizophrenia. *New England Journal of Medicine*. 331 (10): 650-655.

Soumerai, S.B., McLaughlin, T.J., Spiegelman, D., Hertzmark, E., Thibault, G., & Goldman, L. (1997). Adverse outcomes of underuse of beta-blockers in elderly survivors of acute myocardial infarction. *Journal of the American Medical Association*. 277 (2): 115-121.

Soumerai, S.B. (1999). Outcomes of compliance with an AMI practice guideline: abstract, executive summary, and final report. *Report for December 1993-November 1997*. Boston, MA: Harvard Medical School. NTIS No. PB2000-107000.

Outcomes of Pharmaceutical Therapy for HIV Disease

Principal Investigator:
Richard D. Moore, M.D.
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Grant Number: HS07809
Project Period: 02/93 - 01/98
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: The project developed a comprehensive, longitudinal, epidemiological database of more than 4,000 HIV-infected individuals who were followed for a total of more than 12,000 person-years. A *NEJM* article in 1994 that showed racial disparities in the receipt of antiretroviral drug therapy and prophylactic therapy against one of the HIV complications had a major public health policy impact. The validity of the study was further enhanced by a follow-up article in the same journal that demonstrated clinical outcomes of HIV individuals are independent of race, gender, and drug use behavior.

Publications to Date

Bartlett, J.G. & Moore, R.D. (1998). Improving HIV therapy. *Scientific American*. 279: 84-93.

Celentano, D.D., Vlahor, D., Cohn, S., Shadle, V., Obasanjo, O., & Moore, R.D. (1998). Self-reported antiretroviral therapy for HIV infection among injection drug users. *Journal of the American Medical Association*. 280: 544-546.

- Chaisson, R.E., Gallant, J.E., Keruly, J.C., & Moore, R.D. (1998). Impact of opportunistic disease on survival in patients with HIV infection. *AIDS*. 12 (1): 29-33.
- Chaisson, R.E., Keruly, J.C., & Moore, R.D. (1995). Race, sex, drug use, and progression of human immunodeficiency virus disease. *New England Journal of Medicine*. 333 (12): 751-756.
- Chaisson, R.E., Keruly, J.C., McAvinue, S., Gallant, J.E., & Moore, R.D. (1996). Effects of an incentive and education program on return rates for PPD test reading in patients with HIV infection. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*. 11 (5): 455-459.
- Chaisson, R.E. & Moore, R.D. (1997). Prevention of opportunistic infections in the era of improved antiretroviral therapy. *Journal of Acquired Immune Deficiency Syndromes*. 16: S14-S22.
- Chaisson, R.E., Stanton, D.L., Gallant, J.E., Rucker, S., Bartlett, J.G., & Moore, R.D. (1993). Impact of the 1993 revision of the AIDS case definition on the prevalence of AIDS in a clinical setting. *AIDS*. 7: 857-862.
- Dal Pan, G.J., Skolasky, R.L., & Moore, R.D. (1997). The impact of neurologic disease on hospitalizations related to human immunodeficiency virus infection in Maryland, 1991-1992. *Archives of Neurology*. 54 (7): 846-852.
- Eldred, L.J., Wu, A.W., Chaisson, R.E., & Moore, R.D. (1998). Adherence to antiretroviral and *Pneumocystis* prophylaxis in HIV disease. *Journal of Acquired Immune Deficiency Syndromes*. 18: 117-125. 3 (3): 159-167.
- Erbelding, E.J., Merz, W.G., Romagnoli, M.J., Keruly, J.C., Moore, R.D., & Gallant, J.E. (1998). Acyclovir in combination with zidovudine does not prolong survival in advanced HIV disease. *Antiviral Therapy*.
- Fortgang, I.S., & Moore, R.D. (1995). Hospital admissions of HIV-infected patients from 1988 to 1992 in Maryland. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*. 8 (4): 365-372.
- Fortgang, I.S., Belitsos, P.C., Chaisson, R.E., & Moore, R.D. (1995). Hepatomegaly and steatosis in HIV-infected patients receiving nucleoside analog antiretroviral therapy. *American Journal of Gastroenterology*. 90 (9): 1433-1436.
- Gallant, J.E., Chaisson, R.E., Keruly, J.C., & Moore, R.D. (1999). Stavudine in zidovudine (ZDV)-experienced compared with ZDV-naïve patients. *AIDS*. 13 (2): 225-229.
- Gallant, J.E., Chaisson, R.E., & Moore, R.D. (1998). The effect of adjunctive corticosteroids for the treatment of *Pneumocystis carinii* pneumonia on mortality and subsequent complications. *Chest*. 114: 1236-1258.
- Gallant, J.E., McAvinue, S.M., Moore, R.D., Bartlett, J.G., Stanton, D.L., & Chaisson, R.E. (1995). The impact of prophylaxis on outcome and resource utilization in *Pneumocystis carinii* pneumonia. *Chest*. 107 (4): 1018-1023.
- Gallant, J.E., Moore, R.D., & Chaisson, R.E. (1994). Prophylaxis for opportunistic infections in patients with HIV infection. *Annals of Internal Medicine*. 120: 932-944.
- Gallant, J.E., Moore, R.D., Keruly, J., Richman, D.D., Chaisson, R.E., & the ZDV Epidemiology Study Group. (1995). Lack of association between acyclovir use and survival in patients with advanced human immunodeficiency virus disease treated with zidovudine. *Journal of Infectious Diseases*. 172: 346-352.
- Gebo, K.A., Chaisson, R.E., Folkemer, J.G., Bartlett, J.G., & Moore, R.D. (1999). Costs of HIV medical care in the era of highly active antiretroviral therapy. *AIDS*. 13 (8): 963-969.
- Gebo, K.A., Moore, R.D., Keruly, J.C., & Chaisson, R.E. (1996). Risk factors for pneumococcal disease in human immunodeficiency virus-infected patients. *Journal of Infectious Diseases*. 173 (4): 857-862.

- Glesby, M.J., Moore, R.D., & Chaisson, R.E. (1995). Clinical spectrum of herpes zoster in adults infected with human immunodeficiency virus. *Clinical Infectious Diseases*. 21 (2): 370-375.
- Hall, C.S., Raines, C.P., Barnett, S.H., Moore, R.D., & Gallant, J.E. (1999). Efficacy of salvage therapy containing ritonavir and saquinavir after failure of single protease inhibitor-containing regimens. *AIDS*. 13: 1207-1212.
- Lucas, G.M., Chaisson, R.E., & Moore, R.D. (1999). Highly active antiretroviral therapy in a large urban clinic: risk factors for virological failure and adverse drug reactions. *Annals of Internal Medicine*. 131: 81-87.
- Maenza, J.R., Keruly, J.C., Moore, R.D., Chaisson, R.E., Merz, W.G., & Gallant, J.E. (1996). Risk factors for fluconazole-resistant candidiasis in human immunodeficiency virus-infected patients. *Journal of Infectious Diseases*. 173 (1): 219-225.
- Maenza, J.R., Merz, W.G., Romagnoli, M.J., Keruly, J.C., Moore, R.D., & Gallant, J.E. (1997). Infection due to fluconazole-resistant *Candida* in patients with AIDS: prevalence and microbiology. *Clinical Infectious Diseases*. 24: 28-34.
- Manabe, Y.C., Clark, D.P., Moore, R.D., Lamadue, J.A., Dahlman, H.R., Belitos, P.C., Chaisson, R.E., & Sears, C.L. (1998). Cryptosporidiosis in AIDS: correlates of disease and survival. *Clinical Infectious Diseases*. 27: 536-542.
- Manabe, Y.C., Vinetz, J.M., Moore, R.D., Merz, C., Charache, P., & Bartlett, J.G. (1995). *Clostridium difficile* colitis: the prediction of disease at the bedside and efficient use of laboratory testing for diagnosis. *Annals of Internal Medicine*. 123: 835-840.
- Mehta, S., Moore, R.D., & Graham, N.M.H. (1997). Potential factors affecting adherence with HIV therapy. *AIDS*. 11: 1665-1670.
- Moore, R.D. (1999). Outcomes of pharmaceutical therapy of HIV disease: abstract, executive summary, and final report. *Report for February 1993-January 1999*. Baltimore, MD: Johns Hopkins University. NTIS No. PB 2000-100684.
- Moore, R.D. (1998). Understanding the clinical and economic outcomes of HIV therapy: the Johns Hopkins HIV Clinical Practice Cohort. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*. 17 (1, suppl.): S38-S41.
- Moore, R.D. (1999). HIV infection, anemia, and survival. *Clinical Infectious Diseases*. 29: 44-49.
- Moore, R.D. (1999). Schistocytosis and a thrombotic microangiopathy-like syndrome in hospitalized HIV-infected patients. *American Journal of Hematology*. 60 (2): 116-120.
- Moore, R.D. & Bartlett, J.G. (1996). Combination antiretroviral therapy in HIV infection: an economic perspective. *Pharmacoeconomics*. 10 (2): 109-113.
- Moore, R.D., & Chaisson, R.E. (1996). Natural history of opportunistic disease in an HIV-infected urban clinical cohort. *Annals of Internal Medicine*. 124 (7): 633-642.
- Moore, R.D., & Chaisson, R.E. (1997). Cost-utility analysis of prophylactic treatment with oral ganciclovir for cytomegalovirus retinitis. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*. 16 (1): 15-21.
- Moore, R.D., & Chaisson, R.E. (1997). Costs to Medicaid of advancing immunosuppression in an urban HIV-infected patient population in Maryland. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*. 14 (3): 223-231.

- Moore, R.D., & Chaisson, R.E. (1999). Natural history of HIV infection in the era of combination antiretroviral therapy. *AIDS*. 13 (14): 1933-1942.
- Moore, R.D. & Chaisson, R.E. (1995). Survival analysis of two controlled trials of rifabutin prophylaxis against *Mycobacterium avium* complex in AIDS. *AIDS*. 9: 1337-1442.
- Moore, R.D., & Chaisson, R.E. (1997). Cost-effectiveness of prophylaxis for *Mycobacterium avium* complex disease. *American Journal of Medicine*. 333 (12): 751-756.
- Moore, R.D., Cheever, L., Keruly, J.C., & Chaisson, R.E. (1999). Lack of sex difference in CD4 to HIV-1 RNA viral load ratio [letter]. *Lancet*. 353 (9151): 463-464.
- Moore, R.D., Fortgang, I., Keruly, J., & Chaisson, R.E. (1996). Adverse events from drug therapy for human immunodeficiency virus disease. *American Journal of Medicine*. 101 (1): 34-40.
- Moore, R.D., Keruly, J.C., & Chaisson, R.E. (1995). Neutropenia and bacterial infection in acquired immunodeficiency syndrome. *Archives of Internal Medicine*. 155 (18): 1965-1970.
- Moore, R.D., Keruly, J.C., & Chaisson, R.E. (1996). Duration of the survival benefit of zidovudine therapy in HIV infection. *Archives of Internal Medicine*. 156 (10): 1073-1077.
- Moore, R.D., Keruly, J.C., & Chaisson, R.E. (1998). Anemia and survival in HIV infection. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*. 19 (1): 29-33.
- Moore, R.D., Stanton, D., Gopalan, R., & Chaisson, R.E. (1994). Racial differences in the use of drug therapy for HIV disease in an urban community. *New England Journal of Medicine*. 330 (11): 763-768.
- Oursler, K.K., Moore, R.D., & Chaisson, R.E. (1999). Risk factors for cryptococcal meningitis in HIV-infected patients. *AIDS Research and Human Retroviruses*. 15: 625-631.
- Stanton, D.L., Wu, A.W., Moore, R.D., Rucker, S.C., Piazza, M.P., Abrams, J.E., & Chaisson, R.E. (1994). Functional status of persons with HIV infection in an ambulatory setting. *Journal of Acquired Immune Deficiency Syndromes*. 7 (10): 1050-1056.
- Sterling, T., Chaisson, R.E., & Moore, R.D. (1998). The impact of *M. tuberculosis* on subsequent disseminated MAC disease in HIV-infected persons. *AIDS*. 12: 1451-1457.
- Styrt, B.A., Chaisson, R.E., & Moore, R.D. (1997). Prior antimicrobials and staphylococcal bacteremia in HIV-infected patients. *AIDS*. 11 (10): 1243-1248.
- Su, L., Moore, R.D., Keruly, J.C., Kaplan, B.H., Treisman, G.J., Royce, R.A., Koch, & G.G. (1997). Impact of HIV disease status, symptoms, and CD4 count on MOS-HIV scores. *Drug Information Journal*. 31: 1432-1433.
- Sulkowski, M.S., Chaisson, R.E., Karp, C.L., Moore, R.D., Margolick, J.B., & Quinn, T.C. (1998). The effect of acute infectious illnesses on plasma HIV-1 viral load and the expression of serological markers of immune activation among HIV-infected individuals. *Journal of Infectious Diseases*. 178: 1642-1648.

Patient Outcomes Associated with Antidepressant Drugs

Principal Investigator:
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Grant Number: HS07772
Project Period: 03/93 - 02/98
AHRQ Project Officer: Charlotte A. Mullican, M.P.H.

Summary: This prospective study examined the association between patient outcomes and antidepressant treatment of community-dwelling elderly with depressive symptoms. The patient outcomes included health services utilization and health and functional status, including mortality and quality of life.

Publications to Date

Fisher, C. (1996). Measuring quality in assisted living facilities. *Provider*. 22: 12.

Garrard, J., Rolnick, S.J., Nitz, N.M., Luepke, L., Jackson, J., Fischer, L.R., Leibson, C., Bland, P.C., Heinrich, R., & Waller, L.A. (1998). Clinical detection of depression among community-based elderly people with self-reported symptoms of depression. *Journals of Gerontology. Series A, Biological Sciences and Medical Sciences*. 53 (2): M92-101.

Leibson, C.L., Garrard, J., Nitz, N., Waller, L., Indritz, M., Jackson, J., Rolnick, S.J., & Luepke, L. (1999). The role of depression in the association between self-rated physical health and clinically defined illness. *Gerontologist*. 39 (3): 291-298.

Zelterman, D., & Curtsinger, J.W. (1995). Survival curves subjected to occasional insults. *Biometrics*. 51 (3): 1140-1146.

Patient Outcomes with Antibiotic Therapy for Lyme Disease

Principal Investigator:
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University of Maryland
Baltimore, MD 21201

Grant Number: HS07813
Project Period: 03/93 - 02/98
AHRQ Project Officer: Charlotte A. Mullican, M.P.H.

Summary: By prospectively following up with patients reported to the Maryland Lyme Disease Registry, the project addressed the comparative effectiveness of different antibiotic regimens in treating Lyme disease. Lyme disease was found to be underreported and often inappropriately treated in Maryland.

Publications to Date

Coyle, B.S., Strickland, G.T., Liang, Y.Y., Pena, C., McCarter, R., & Israel, E. (1996). The public health impact of Lyme disease in Maryland. *Journal of Infectious Diseases*. 173 (5): 1260-1262.

Fix, A.D., Strickland, T., Grant, J. (1998). Tick bites and Lyme disease in an endemic setting. *Journal of the American Medical Association*. 279 (3): 206-210.

Jung, P.I., Nahas, J.N., Strickland, G.T., McCarter, R., & Israel, E. (1994). Maryland physicians' survey on Lyme disease. *Maryland Medical Journal*. 43 (5): 447-450.

Pena, C.A., Mathews, A.A., Siddiqi, N.H., & Strickland, G.T. (1999). Antibiotic therapy for Lyme disease in a population-based cohort. *Clinical Infectious Diseases*. 29 (3): 694-695.

- Pena, C.A., & Strickland, G.T. (1999). Incidence rates of Lyme disease in Maryland: 1993 through 1996. *Maryland Medical Journal*. 48 (2): 68-73.
- Steinberg, S.H., Strickland, G.T., Pena, C., & Israel, E. (1996). Lyme disease surveillance in Maryland, 1992. *Annals of Epidemiology*. 6 (1): 24-29.
- Strickland, G.T., Caisley, I., Woubeshet, M., & Israel, E. (1994). Antibiotic therapy for Lyme disease in Maryland. *Public Health Reports*. 109 (6): 745-749.
- Strickland, G.T. (2000). Patient outcomes with antibiotic therapy of Lyme disease: abstract, executive summary, and final report. *Report for March 1993-February 1999*. Baltimore, MD: University of Maryland at Baltimore. NTIS Number: PB2000-106707.
- Strickland, G.T., Karp, A.C., Mathews, A., & Pena, C.A. (1997). Utilization and cost of serologic tests for Lyme disease in Maryland. *Journal of Infectious Diseases*. 176 (3): 819-821.
- Strickland, G.T., Trivedi, L., Watkins, S., Clothier, M., Grant, J., Morgan, J., Schmidtman, E., & Burkot, T. (1996). Cluster of Lyme disease cases at a summer camp in Kent County, Maryland. *Emerging Infectious Diseases*. 2 (1): 44-46.

Pharmaceutical Care and Pediatric Asthma Outcomes

Principal Investigator:
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Grant Number: HS07834
Project Period: 03/93 - 02/97
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: This was a community-based, randomized controlled trial to demonstrate the effectiveness and cost-effectiveness of a pharmacist intervention program to enhance the outcomes of asthma care in children. However, the final result failed to support the program's effectiveness. It also raised a question on the value of conducting a randomized controlled trial when the assurance of protocol compliance could not be obtained.

Publications to Date

- McRorie, T., Gardner, J., Sullivan, S., Walker, M., Andrilla, H., & Stergachis, A. (1995). A structured pharmaceutical care intervention for ambulatory pediatric asthma patients [abstract]. *Pharmacotherapy*. 15: 400.
- McRorie, T., Walker, M., Sullivan, S., Gardner, J., Andrilla, H., & Stergachis, A. (1995). An instrument for the evaluation of prescribed and actual medication use in pediatric asthma [abstract]. *Pharmacotherapy*. 15: 395.
- Stergachis, A.S. (1999). Pharmaceutical care and pediatric asthma outcomes: abstract, executive summary, and final report. *Report for March 1993-February 1998*. Seattle, WA: University of Washington. NTIS No. PB 2000-101828.

Pharmaceutical Care Outcomes: The Patient Role

Principal Investigator:
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Grant Number: HS07773
Project Period: 03/93 - 02/98
AHRQ Project Officer: Charlotte A. Mullican, M.P.H.

Summary: This project examined from a patient's perspective the process and outcomes of arthritis patients' drug regimen decisions by seeing (1) how patients' perceptions about quality of life, symptoms, and medication benefits affect adherence and over-the-counter self-care use; (2) the effects of patient medication-taking behaviors on arthritis outcomes, including quality of life, clinical symptoms, and health care utilization; and (3) how patients' perceptions of quality of life vary with their clinical symptoms. Individuals were interviewed (over the phone and in the clinic); client diaries reviewed; pharmacy patient profiles collected; and laboratory and physical measurements taken. In addition, the investigators examined whether the AIMS2 and SF-36 differed in their sensitivity to changes in clinical symptoms.

Publications to Date

Chewning, B., Bell, C., Nowlin, N., Wilson, D., Chappel, R., Boh, L., & Boh, D. (1994). A comparison of AIMS2 and SF-36 health quality of life measures [abstract]. *Arthritis and Rheumatism*. 37 (9, suppl.): S225.

Chewning, B.A., Bell, C.L., Nowlin, N.S., Wilson, D.A., Chappell, R., Boh, L.E., & Boh, D.M. (1994). A comparison of AIMS2 and SF-26 for measuring arthritis patients' quality of life and functional health status [abstract]. *Arthritis and Rheumatism*. 37 (6, suppl.): R13.

Nowlin, N.S., Bell, C.L., Chewning, B.A., Wilson, D.A., Boh, D.M., Boh, L.E., & Chappell, R. (1994). Nondrug alternative therapy for arthritis [abstract]. *Arthritis and Rheumatism*. 37 (6, suppl.): R14.

Use of Record Linkage to Study Outcomes of Drug Therapy

Principal Investigator:
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Grant Number: HS07821
Project Period: 08/93 - 07/98
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: This project sought to evaluate patient adherence to antihypertensive therapy in a managed care setting using a variety of methodologies, including patient self-report, microelectronic technology in the medication container, pharmacy dispensing records, and pill counts. By using a relatively new microelectronic technology, the project aimed to achieve four major objectives. These were developing a standard definition of adherence; validating other alternative methods of adherence assessment such as patient-reports, pharmacy dispensing records, or pill counts; evaluating the relationship between adherence and a target medical condition; and examining the predictors of adherence. The target condition was hypertension. Research was conducted in a managed care setting. Adherence levels determined from pill counts and pharmacy dispensing records correlated more closely with quantity than with dose timing; and patient-reported nonadherence was a valid predictor of reduced adherence.

Publications to Date

Choo, P.W., Rand, C.S., Inui, T.S., Lee, M.L., Cain, E.M., Cordeiro, M.A., Canning, C.F., Platt, R. (1998). Dose frequency and timing in validation of studies of pill counts and pharmacy refill adherence. *Pharmacoepidemiology and Drug Safety*. 7 (Suppl. 2): S93.

Choo, P.W., Rand, C.S., Inui, T.S., Lee, M.L., Cain, E.M., Cordeiro-Breault, M.A., Canning, C.F., Platt, R. (1998). Assessment of exposure to antihypertensive agents by pharmacy records, pill counts, patient reports, and electronic monitors. *Pharmacoepidemiology and Drug Safety*. 7 (Suppl. 2): S94.

Platt, R. (1998). Record linkage and outcomes of drug therapy: abstract, executive summary, and final report. *Report for August 1993-July 1998*. Boston, MA: Brigham and Women's Hospital. NTIS No. PB 99-124042.

A Health Status Measure to Evaluate Drug Therapy for PCP

Principal Investigator:
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Grant Number: HS07824
Project Period: 09/93 - 08/95
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: As the first study in developing and using a health status measure in a clinical trial of an AIDS-related complication, this project was designed to demonstrate the reliability, validity, and usefulness of a brief health status measure for acute *Pneumocystis carinii* pneumonia. Unlike traditional methodology studies in the field, this project added two new dimensions, responsiveness and clinical utility, in the evaluation of a health status instrument. By so doing, the project has enhanced the traditional validation approach that was based exclusively on reliability and validity of the instrument, and set a new model for the future studies in the field.

Publications to Date

Gray, S.M., & Brookmeyer, R. (1998). Estimating a treatment effect from multidimensional longitudinal data. *Biometrics*. 54 (3): 976-988.

Safrin, S., Finkelstein, D.M., Feinberg, J., Frame, P., Simpson, G., Wu, A., Cheung, T., Soeiro, R., Hojczyk, P., & Black, J.R. (1996). Comparison of three regimens for treatment of mild to moderate *Pneumocystis carinii* pneumonia in patients with AIDS. A double-blind, randomized trial of oral trimethoprim-sulfamethoxazole, dapsone-trimethoprim, and clindamycin-primaquine. ACTG 108 Study Group. *Annals of Internal Medicine*. 124 (9): 792-802.

Wu, A.W., & Lamping, D.L. (1994). Assessment of quality of life in HIV disease. *AIDS*. 8 (1, suppl.): S349-S359.

Wu, A.W., Brookmeyer, R., Gray, S., Rubin, H.R., & Steinwachs, D.A. (1996). Health status measure to evaluate drug therapy for PCP: abstract, executive summary, final report, and appendices A, B, D. *Report for September 1993-August 1995*. Baltimore: Johns Hopkins University. (NTIS No. PB96-182555).

Wu, A.W., Gray, S.M., & Brookmeyer, R. (1999). Application of random effects models and other methods to the analysis of multidimensional quality of life data in an AIDS clinical trial. *Medical Care*. 37 (3): 249-258.

Wu, A.W., Hays, R.D., Kelly, S., Malitz, F., & Bozzette, S.A. (1997). Applications of the Medical Outcomes Study health-related quality of life measures in HIV/AIDS. *Quality of Life Research*. 6 (6): 531-554.

Wu, A.W., Revicki, D.A., Jacobson, D., & Malitz, F. Reliability, validity, and usefulness of the MOS HIV health survey. *Quality of Life Research*. 1997 Aug; 6 (6): 481-493.

Wu, A.W., Revicki, D.A., Jacobson, D., & Malitz, F.E. (1997). Evidence for reliability, validity, and usefulness of the Medical Outcomes Study HIV Health Survey (MOS-HIV). *Quality of Life Research*. 6 (6): 481-493.

Cognitive Impairment and Medication Appropriateness

Principal Investigator:
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Grant Number: HS07819
Project Period: 03/93 - 05/95
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: Built on a series of secondary data analyses using the longitudinal data from a representative sample of community-dwelling elderly, the project evaluated the relationship between cognitive status and medication use. Focused on two classes of commonly used medications in the elderly, the study demonstrated, in a dose-response fashion, that current benzodiazepine use is associated with memory impairment while NSAID use is not. The study also provided some clues to the pattern of medication use after the elderly develop cognitive impairment. In general, those elderly were less likely to use over-the-counter medications and analgesics than cognitively intact community-dwelling elderly.

Publications to Date

Fillenbaum, G.G., Hanlon, J.T., Landerman, L.R., & Schmader, K. (1998). Estrogen use and future performance on a cognitive screen. *Gerontologist*. 38 (SII): 259.

Fillenbaum, G.G., Horner, R., Hanlon, J., Landerman, L.R., Dwason, D., & Cohen, H.J. (1995). Change in use of prescription and non-prescription drugs by black and white elderly living at home [abstract]. *Gerontologist*. 35: 257.

Fillenbaum, G.G., Horner, R.D., Hanlon, J.T., Landerman, L.R., Dawson, D.V., & Cohen, H.J. (1996). Factors predicting change in prescription and nonprescription drug use in a community-residing black and white elderly population. *Journal of Clinical Epidemiology*. 49 (5): 587-593.

Hanlon, J., Landerman, L.R., Wall, W., Horner, R., Fillenbaum, G., Dawson, D.V., Schmader, K., Blazer, D., & Cohen, H.J. (1994). Drug use patterns among cognitively impaired and intact community dwelling elderly [abstract]. *Journal of the American Geriatrics Society*. 42: SA44.

Hanlon, J.T., Horner, R.D., Schmader, K.E., Fillenbaum, G.G., Lewis, I.K., Wall, W.E., Jr., Landerman, L.R., Pieper, C.F., Blazer, D.G., & Cohen, H.J. (1998). Benzodiazepine use and cognitive function among community-dwelling elderly. *Clinical Pharmacology and Therapeutics*. 64 (6): 684-692.

Hanlon, J.T., Horner, R.D., Schmader, K.E., Fillenbaum, G.G., Lewis, I.K., Wall, W.E., Landerman, L.R., Pieper, C.F., Blazer D.G., & Cohen, H.J. (1995). Benzodiazepine use and cognitive function among community dwelling elderly [abstract]. *Pharmacotherapy*. 15: 56-57.

Hanlon, J.T. (1995). Cognitive impairment and medication appropriateness: abstract, executive summary, and final report. *Report for March 1993-May 1995*. Durham, NC: Duke University Medical Center. (NTIS No. PB96-116223).

Hanlon, J.T., Landerman, L.R., Wall, W.E., Jr., Horner, R.D., Fillenbaum, G.G., Dawson, D.V., Schmader, K.E., Cohen, H.J., & Blazer, D.G. (1996). Is medication use by community-dwelling elderly people influenced by cognitive function? *Age and Aging*. 25: 190-196.

Hanlon, J.T., Schmader, K., Landerman, L.R., Horner, R., Fillenbaum, G.G., Pieper, C., Wall, W.E., Koronkowski, M., & Cohen, H.J. (1995). Nonsteroidal anti-inflammatory drug use and cognitive function among community dwelling elderly [abstract]. *American Geriatrics Society Meeting*. SA5.

Hanlon, J.T., Schmader, K.E., Landerman, L.R., Horner, R.D., Fillenbaum, G.C., Pieper, C.F., Wall, W.E., Koronkowski, M.J., & Cohen, H.J. (1997). Relation of prescription nonsteroidal antiinflammatory drug use and cognitive function among community dwelling elderly. *Annals of Epidemiology*. 7: 87-94.

Hickey, A., Hanlon, J.T., & Guess, H.A. (1997). Digoxin and cognitive impairment in the elderly. *Pharmacoepidemiology and Drug Safety*. 6 (2, suppl.): 223.

Schmader, K., Hanlon, J.T., Huber, M., Fillenbaum, G.C., Horner, R., & Pieper, C. (1996). Medication use patterns among demented, cognitively impaired and cognitively intact community-dwelling elderly [abstract]. *Journal of the American Geriatrics Society*. 44: S22.

Schmader, K.E., Hanlon, J.T., Fillenbaum, G.G., Huber, M., Pieper, C., & Horner, R. (1998). Medication use patterns among demented, cognitively impaired and cognitively intact community-dwelling elderly people. *Age and Aging*. 27 (4): 493-501.

Preference Assessment for Pharmaceutical Evaluation

Principal Investigator:
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Grant Number: HS07818
Project Period: 03/93 - 08/96
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: The underlying economic principles for the preference assessment, which serves as the foundation for quality of life (QOL) measurement, are somewhat complicated. Aimed at increasing a subject's understanding of the preference assessment instrument and to detect inconsistencies in response, the project developed a computer-based multimedia presentation of health states and preference elicitation to provide support for the preference assessment process. The project demonstrated the validity, reliability, and usefulness of this multimedia presentation. In addition, the project also found that when a subject assigns a preference to a health state, that preference appears to be affected by the subject's current health state.

Publications to Date

Beutler, E., & Garber, A.M. (1994). Alglucerase for Gaucher's disease: dose, costs and benefits [editorial]. *PharmacoEconomics*. 5 (6): 453-459.

Garber, A.M. (1996). Preference Assessment for Pharmaceutical Evaluation: Abstract, Executive Summary, and Final Report. *Report for March 1993-September 1996*. Stanford: Stanford University. (NTIS No. PB97-134431).

Goldstein, M.K., Clarke, A.E., Michelson, D., Bergen, M.R., Garber, A.M., & Lenert, L.A. (1993). The impact of multi-media presentation on subjects' understanding of health states for preference assessment [abstract]. *Clinical Research*. 41: 270A.

Goldstein, M.K., Clarke, A.E., Michelson, D., Garber, A.M., Bergen, M.R., & Lenert, L.A. (1994). Developing and testing a multimedia presentation of a health-state description. *Medical Decision Making*. 14 (4): 336-344.

Goldstein, M.K., Lenert, L.A., Brown, B.W., & Clarke, A.E. (1993). Measuring uncertainty in ratings of quality of life [abstract]. *Medical Decision Making*. 13 (4): 387.

Goldstein, M.K., Lenert, L.A., Clarke, A.E., Michelson, D.J., & Garber, A.M. (1993). Assessing preferences for multidimensional health states: utilities of activities of daily living (ADLs) [abstract]. *Medical Decision Making*. 13 (4): 386.

Goldstein, M.K., Lenert, L.A., Michelson, D.J., Clarke, A.E., & Garber, A.M. (1994). Learning effects during elicitation of utilities from frail elders for activities of daily living [abstract]. *Clinical Research*. 42 (2): 227A.

Lenert, L.A., Michelson, D., Flowers, C., & Bergen, M.R. (1995). IMPACT: an object-oriented graphical environment for construction of multimedia patient interviewing software. *Proceedings of the Annual Symposium on Computer Applications in Medical Care*. 319-323.

Pharmaceutical Cost, Use, and Outcome Among Insured Elderly

Principal Investigator:
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Grant Number: HS08217
Project Period: 09/93 - 08/96
AHRQ Project Officer: Charlotte A. Mullican, M.P.H.

Summary: The study database was a group of 19,350 retirees of the Public Employees Retirement System (PERS) who were demographically representative of the general Medicare population. The database maximized its epidemiological potential by linking with Medicare Claim data of those PERS individuals. Based on this combined database, the study found that none of the prescription copayment options except a 50% prescription copayment affected utilization of and expenditures for pharmaceuticals and their generic substitutions. Furthermore, none of those copayment options produced observable changes on subsequent use and expenditures of medical care services among those retirees.

Publications to Date

Gardner, L.B. (1996). Pharmaceutical Use and Cost Among Insured Elderly: Abstract, Executive Summary, and Final Report. *Report for September 1993-September 1996*. Berkeley: Western Consortium for Public Health. (NTIS No. PB97-165856).

Sullivan, S.D., Gardner, L.B., & Strandberg, L.R. (1994). The economics of outpatient prescription drug coverage for the elderly: implications for healthcare reform. *Generations*. (Summer): 55-60.

Statistical Methods for Quality-of-Life Outcomes Research

Principal Investigator:
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Grant Number: HS07767
Project Period: 03/93 - 02/97
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: The investigators: (1) evaluated and analyzed current and potential measurement and statistical techniques used in assessing quality-of-life-related patient outcomes through a review of the literature; (2) refined existing analytical and statistical methodology so that it was appropriate for evaluation of pharmacologic therapies; and (3) developed data analysis demonstration projects within major analytical areas by applying selected methods to existing quality-of-life clinical trials databases of hypertension, diabetes, and human immunodeficiency virus.

Publications to Date

Anderson, R.B., & Testa, M.A. (1994). Symptom distress checklists as a component of quality of life measurement: comparing prompted reports by patient and physician with concurrent adverse event reports via the physician. *Drug Information Journal*. 28: 89-114.

- Andrade, S.E., Walker, A.M., Gottlieb, L.K., Hollenberg, N.K., Testa, M.A., Saperia, G.M., & Platt, R. (1995). Discontinuation of antihyperlipidemic drugs—do rates reported in clinical trials reflect rates in primary care settings? *New England Journal of Medicine*. 332 (17): 1125-1131.
- Fuleihan, G.E., Testa, M.A., Angell, J.E., Porrino, N., & Leboff, M.S. (1995). Reproducibility of DXA absorptiometry: a model for bone loss estimates. *Journal of Bone and Mineral Research*. 10 (7): 1004-1014.
- Lenderking, W.R., Gelber, R.D., Cotton, D.J., Cole, B.F., Goldhirsch, A., Volberding, P.A., & Testa, M.A. (1994). Evaluation of the quality of life associated with zidovudine treatment in asymptomatic human immunodeficiency virus infection. The AIDS Clinical Trials Group. *New England Journal of Medicine*. 330 (11): 738-743.
- Nackley, J.F., & Testa, M.A. (1993). How it works in the field: quality of life assessments in the clinical trials setting [abstract]. *Drug Information Journal*. 27: 855.
- Testa, M.A., & Lenderking, W.R. (1995). *Quality-of-Life Considerations in AIDS Clinical Trials*. Wiley-Liss Inc., New York.
- Testa, M.A., & Lenderking, W.R. (1999). The impact of AIDS-associated wasting on quality of life: qualitative issues of measurement and evaluation. *Journal of Nutrition*. 129 (1S, suppl.): 282S-289S.
- Testa, M.A., & Nackley, J.F. (1994). Methods for quality-of-life studies. *Annual Review of Public Health*. 15: 535-559.

Projects Funded Through RFA HS-96-003: Research on the Outcomes of Pharmaceutical Therapy

Community-Based Pharmaceutical Care: A Controlled Trial

Principal Investigator:
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Grant Number: HS09083
Project Period: 06/96 - 05/00
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: The purpose of this study was to develop algorithms to facilitate pharmaceutical care for the treatment of asthma. A randomized controlled trial, with 460 patients in a pharmacy intervention group and 2 control groups, was undertaken. The pharmacy intervention group was given patient-specific clinical information displayed on their computer workstations when filling prescriptions. This study took advantage of Indiana University's long-standing project to develop an electronic medical record. Patient records were available to the pharmacist from 6 hospitals and 234 free-standing clinics. Pharmacy records were also made available to these linked providers.

Impact of Prospective Drug Use Review on Health Outcomes

Principal Investigator:
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Grant Number: HS09075
Project Period: 08/96 - 07/98
AHRQ Project Officer: Lynn A. Bosco, M.D., M.P.H.

Summary: The purpose of this study was to compare two different models of outpatient prospective drug utilization review (ProDUR) programs in the state of Pennsylvania, one of which allowed active participation by a pharmacist in the process while the other did not. The study aimed to (1) conduct a descriptive epidemiological analysis of psychotropic drug use, prescribing patterns, and yield of ProDUR interventions, and compute estimates of drug-related outcome measures; and (2) to evaluate the independent effects of two different ProDUR procedures on health outcomes. The investigators used data from PACE and Medicaid. Outcomes to be studied included hospitalization and utilization of other health-related resources.

Appendix A

Other Pharmaceutical-Related Projects

The Consequences of Variation in Treatment for Acute Myocardial Infarction (HS06341)

Antman, E.M. (1995). Randomized trials of magnesium in acute myocardial infarction: big numbers do not tell the whole story. *American Journal of Cardiology*. 75 (5): 391-393.

Antman, E.M., & Berlin, J.A. (1992). Declining incidence of ventricular fibrillation in myocardial infarction: implications for the prophylactic use of lidocaine. *Circulation*. 86 (3): 764-773.

Antman, E.M., Cannon, C.P., Mueller, H., Muller, J., Schweiger, M., Davis, V., Perritt, R., & Braunwald, E. (1994). Do clinical trials results influence physician drug use in myocardial infarction? [abstract]. *Circulation*. 90: I-167.

Antman, E.M., Lau, J., Kupelnick, B., Mosteller, F., & Chalmers, T.C. (1992). A comparison of results of meta-analyses of randomized control trials and recommendations of clinical experts: treatments for myocardial infarction. *Journal of the American Medical Association*. 268 (2): 240-248.

Ayanian, J.Z. (1995). Knowledge of drugs for myocardial infarction: generalists versus specialists [reply to letters]. *New England Journal of Medicine*. 332 (7): 473-474.

Ayanian, J.Z., Hauptman, P.J., Guadagnoli, E., Antman, E.M., Pashos, C.L., & McNeil, B.J. (1994). Knowledge and practices of generalist and specialist physicians regarding drug therapy for acute myocardial infarction. *New England Journal of Medicine*. 331 (17): 1136-1142.

Krumholz, H.M., Pasternak, R.C., Weinstein, M.C., Friesinger, G.C., Ridker, P.M., Tosteson, A.N.A., Goldman, L. (1992). Cost-effectiveness of thrombolytic therapy with streptokinase in elderly patients with suspected acute myocardial infarction. *New England Journal of Medicine*. 327: 7-13.

Jovell, A.J., Lau, J., Berkey, C., Kupelnick, B., Chalmers, T.C. (1993). Early angiography and angioplasty following thrombolytic therapy of acute myocardial infarction: meta-analyses of the randomized control trials. *Online Journal of Current Clinical Trials (serial online)*. June 5, 1993.

Lau, J., Antman, E.M., Jimenez-Silva, J., Kupelnick, B., Mosteller, F., & Chalmers, T.C. (1992). Cumulative meta-analysis of therapeutic trials for myocardial infarction. *New England Journal of Medicine*. 327 (4): 248-254.

McNeil, N.J. (1995). The Consequences of Variation in Treatment for Acute Myocardial Infarction: Patient Outcomes Research Team (PORT) Final Report. NTIS No. PB 95-265450.

Pashos, C.L., Normand, S.L.T., Garfinkle, J.B., Newhouse, J.P., Epstein, A.M., & McNeil, B.J. (1994). Trends in the use of drug therapies in patients with acute myocardial infarction: 1988 to 1992. *Journal of the American College of Cardiology*. 23 (5): 1023-1030.

Soumerai, S.B., McLaughlin, T.J., Spiegelman, D., Hertzmark, E., Thibault, G., & Goldman, L. (1997). Adverse outcomes of underuse of beta-blockers in elderly survivors of acute myocardial infarction. *Journal of the American Medical Association*. 277 (2): 115-21.

Back Pain Outcome Assessment Team (HS06344)

Cherkin, D.C., Wheeler, K.J., Barlow, W., & Deyo, R.A. (1998). Medication use for low back pain in primary care. *Spine*. 23 (5):607-614.

Deyo, R.A. (1995). Improving the Effectiveness and Efficacy of Medical Care for Low Back Pain: Patient Outcomes Research Team (PORT) Final Report. NTIS No. PB 95-250601.

Turner, J.A., & Denny, M. (1994). Pain medication [response to letter]. *Journal of Family Practice*. 38 (4): 333.

Turner, J.A., & Denny, M.C. (1993). Do antidepressant medications relieve chronic low back pain? *Journal of Family Practice*. 37 (6): 545-553.

Turner, J.A., Deyo, R.A., Loeser, J.D., Fordyce, W.E., & Von Korff, M. (1995). The importance of placebo effects in pain treatment and research [response to letter]. *Journal of the American Medical Association*. 273 (4): 284.

Turner, J.A., Deyo, R.A., Loeser, J.D., Von Korff, M., & Fordyce, W.E. (1994). The importance of placebo effects in pain treatment and research. *Journal of the American Medical Association*. 271 (20): 1609-1614.

Outcome Assessment Program in Ischemic Heart Disease (HS06503)

DeLong, E.R. (1995) Outcome Assessment Program for Ischemic Heart Disease: Patient Outcomes Research Team (PORT) Final Report. Report for July 1990-December 1995. NTIS No. PB 98-156557.

Eckman, M.H., Levine, H.J., & Pauker, S.G. (1993). Effect of laboratory variation in the prothrombin-time ratio on the results of oral anticoagulant therapy. *New England Journal of Medicine*. 329 (10): 696-702.

Eckman, M.H., Levine, H.J., & Pauker, S.G. (1995). Making decisions about antithrombotic therapy in heart disease. Decision analytic and cost-effectiveness issues. *Chest*. 108 (4, suppl.): 457S-470S.

Eckman, M.H., Wong, J.B., Salem, D.N., & Pauker, S.G. (1992). Direct angioplasty for acute myocardial infarction: a review of outcomes in clinical subsets. *Annals of Internal Medicine*. 117 (8): 667-676.

Mark, D.B., Cowper, P.A., Berkowitz, S.D., Davidson-Ray, L., DeLong, E.R., Turpie, A.G., Califf, R.M., Weatherley, B., & Cohen, M. (1998). Economic assessment of low-molecular-weight heparin (enoxaparin) versus unfractionated heparin in acute coronary syndrome patients: results from the ESSENCE randomized trial. Efficacy and Safety of Subcutaneous Enoxaparin in Non-Q wave Coronary Events. *Circulation*. 97 (17):1702-1707.

Mark, D.B., Hlatky, M.A., Califf, R.M., Naylor, D.C., Lee, K.L., Armstrong, P.W., Barbash, G., White, H., Simoons, M.L., & Nelson, C.L. (1995). Cost effectiveness of thrombolytic therapy with tissue plasminogen activator as compared with streptokinase for acute myocardial infarction. [Published erratum appears in New England Journal of Medicine 1995 Jul 27; 333(4): 267]. *New England Journal of Medicine*. 332 (21):1418-1424.

Rocca, B., & FitzGerald, G.A. (1997). Simply read: erythrocytes modulate platelet function. Should we rethink the way we give aspirin? [editorial; comment]. *Circulation*. 95 (1): 11-13.

Low Birthweight in Minority and High-Risk Women (290-92-0055)

Atkinson, M.W., Cliver, S.P., McNeal, S.F., Cutter, G.R., Malloy, M.H., & Goldenberg, R.L. (1995). The association between maternal corticosteroid and tocolytic therapy and neonatal outcome in very low birth weight infants [abstract]. *American Journal of Obstetrics and Gynecology*. 911.

Atkinson, M.W., Gaudier, F.L., Cliver, S.P., Nelson, K., Peralta, M., Hauth, J.C., & Goldenberg, R.L. (1994). The interaction of maternal corticosteroid and tocolytic treatment on morbidity and mortality rates in very low birthweight infants [abstract]. *American Journal of Obstetrics and Gynecology*. 170 (1): 386.

- Atkinson, M.W., Goldenberg, R.L., Gaudier, F.L., Cliver, S.P., Nelson, K.G., Merkatz, I.R., & Hauth, J.C. (1995). Maternal corticosteroid and tocolytic treatment and morbidity and mortality in very low birth weight infants. *American Journal of Obstetrics and Gynecology*. 173 (1): 299-305.
- Bronstein, J.M., & Goldenberg, R.L. (1995). Practice variation in the use of corticosteroids: a comparison of eight data sets. *American Journal of Obstetrics and Gynecology*. 173 (1): 296-298.
- Gardner, M., Bronstein, J., Goldenberg, R.L., Haywood, J.L., Cliver, S.P., & Nelson, K.G. (1996). Physician opinions of preterm infant outcome and their effect on antenatal corticosteroid use. *Journal of Perinatology*. 16 (6): 431-434.
- Gardner, M.O., & Goldenberg, R.L. (1995). The clinical use of antenatal corticosteroids. *Clinical Obstetrics and Gynecology*. 38 (4): 746-54.
- Gardner, M.O., & Goldenberg, R.L. (1996). Use of antenatal corticosteroids for fetal maturation. *Current Opinion in Obstetrics and Gynecology*. 8 (2): 106-109.
- Gardner, M.O., Goldenberg, R.L., Gaudier, F.L., DuBard, M.B., Nelson, K.G., & Hauth, J.C. (1995). Predicting low Apgar scores of infants weighing less than 1000 grams: the effect of corticosteroids. *Obstetrics and Gynecology*. 85 (2): 170-174.
- Goldenberg, R.L. (1998). Low Birthweight in Minority and High-Risk Women: Patient Outcomes Research Team (PORT) Final Report. Report for September 1992-April 1998. NTIS No. PB 98-156565.
- Hauth, J.C., Goldenberg, R.L., Andrews, W.W., Copper, R.L., DuBard, M.B., & Schmid, T. (1995). The effect of mid-trimester metronidazole plus erythromycin on bacterial vaginosis and other markers of altered vaginal flora [abstract]. *American Journal of Obstetrics and Gynecology*. 172 (1, pt. 2): A152.
- Hauth, J.C., Goldenberg, R.L., Andrews, W.W., DuBard, M.B., & Copper, R.L. (1995). Reduced incidence of preterm delivery with metronidazole and erythromycin in women with bacterial vaginosis. *New England Journal of Medicine*. 333 (26): 1732-6.
- Hauth, J.C., Goldenberg, R.L., Andrews, W.W., DuBard, M.B., & Copper, R.L. (1995). Mid-trimester treatment with metronidazole plus erythromycin reduces preterm delivery only in women with bacterial vaginosis [abstract]. *American Journal of Obstetrics and Gynecology*. 172 (1, pt. 2): A4.
- Leviton, L.C., Baker, S., Hassol, A., & Goldenberg, R.L. (1995). An exploration of opinion and practice patterns affecting low use of antenatal corticosteroids. *American Journal of Obstetrics and Gynecology*. 173 (1): 312-316.
- Maher, J., Goldenberg, R., Cliver, S., Davis, R., & Copper, R. (1993). Corticosteroid efficacy in very premature infants [abstract]. *American Journal of Obstetrics and Gynecology*. 168 (1, pt. 2): A272.
- Maher, J.E., & Goldenberg, R.L. (1993). Outcomes of very-low-birth-weight infants after maternal corticosteroid therapy before 28 weeks' gestation. *American Journal of Obstetrics and Gynecology*. 169 (5): 1363-1364.
- Maher, J.E., Cliver, S.P., Goldenberg, R.L., Davis, R.O., Copper, R.L., & the March of Dimes Multicenter Study Group. (1994). The effect of corticosteroid therapy in the very premature infant. *American Journal of Obstetrics and Gynecology*. 170 (3): 869-873.
- Rouse, D.J., Owen, J., Goldenberg, R.L., & Vermund, S.H. (1995). Zidovudine for the prevention of vertical HIV transmission: a decision analytic approach. *Journal of Acquired Immune Deficiency Syndromes and Human Retrovirology*. 9 (4): 401-407.

Rouse, D.J., Owen, J., Goldenberg, R.L., & Vermund, S.H. (1995). Zidovudine for the prevention of vertical HIV transmission: a decision analytic approach [abstract]. *American Journal of Obstetrics and Gynecology*. 172 (1 pt. 2): A171.

Assessment of the Variation and Outcomes of Pneumonia (HS06468)

Fine, M.J., Smith, M.A., Carson, C.A., Meffe, F., Sankey, S.S., Weissfeld, L.A., & Kapoor, W.N. (1993). Effectiveness of polyvalent pneumococcal vaccination: a meta-analysis of randomized trials [abstract]. *Clinical Research*. 41 (2): 518A.

Fine, M.J., Smith, M.A., Carson, C.A., Meffe, F., Sankey, S.S., Weissfeld, L.A., Detsky, A.S., & Kapoor, W.N. (1994). Efficacy of pneumococcal vaccination in adults: a meta-analysis of randomized controlled trials. *Archives of Internal Medicine*. 154 (23): 2666-2677.

Gilbert, K., Kapoor, W.N., Marrie, T.J., Singer, D.E., Coley, C.M., Lave, J.R., Hough, L.J., & Fine, M.J. (1994). Variation in antibiotic use and costs in patients with community-acquired pneumonia [abstract]. *Journal of General Internal Medicine*. 9 (9): 53.

Gilbert K, Gleason P.P., Singer D.E., Marrie T.J. Variations in antimicrobial use and cost in more than 2,000 patients with community-acquired pneumonia. *American Journal of Medicine*, 1998 January, 104: 17-27.

Gleason, P.P., Kapoor, W.N., Lave, J.R., Stone, R.A., Obrosky, D.S., Schulz, R., Singer, D.E., Coley, C.M., Marrie, T.H., & Fine, M.J. American Thoracic Society guidelines for empiric antimicrobial therapy of outpatients with community-acquired pneumonia: implications for medical outcomes and antimicrobial costs. *Journal of the American Medical Association*. 1997 July 2; 278 (1): 32-39.

Gleason, P.P., Kapoor, W.N., Stone, R.A., Lave, J.R., Obrosky, D.S., Schulz, R., Singer, D.E., Coley, C.M., Marrie, T.J., & Fine, M.J. (1997). Medical outcomes and antimicrobial costs with the use of the American Thoracic Society guidelines for outpatients with community-acquired pneumonia. *Journal of the American Medical Association*. 278 (1): 32-39.

Gleason, P.P., Meehan, T.P., Fine, J.M., Galusha, D.H., Fine, M.J. Associations between initial antimicrobial therapy and medical outcomes for hospitalized elderly patients with pneumonia. *Archives of Internal Medicine*, 1999 November 22, 159 (21): 2562-2572.

Schizophrenia Patient Outcomes Research Team (290-92-0054)

Buchanan, R.W. (1995). Clozapine: efficacy and safety. *Schizophrenia Bulletin*. 21 (4): 579-591.

Dixon, L.B., & Lehman, A.F. (1995). Family interventions for schizophrenia. *Schizophrenia Bulletin*. 21 (4): 631-643.

Dixon, L.B., Lehman, A.F., & Levine, J. (1995). Conventional antipsychotic medications for schizophrenia. *Schizophrenia Bulletin*. 21 (4): 567-577.

Johns, C.A., & Thompson, J.W. (1995). Adjunctive treatments in schizophrenia: pharmacotherapies and electroconvulsive therapy. *Schizophrenia Bulletin*. 21 (4): 607-619.

Umbricht, D., & Kane, J.M. (1995). Risperidone: efficacy and safety. *Schizophrenia Bulletin*. 21 (4): 593-606.

Appendix B
***Fact Sheet on Centers for Education and Research on
Therapeutics (CERTs)***

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